

AT FIFW/18

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FEE TRANSMITTAL For FY 2005 Effective on 12/8/2004. Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).		Complete if Known	
		Application Number	10/623,243
		Filing Date	07/17/2003
		First Named Inventor	Alawani
		Examiner Name	Levi, Dameon E.
<input type="checkbox"/> Applicant Claims small entity status. See 37 CFR 1.27		Art Unit	2841
TOTAL AMOUNT OF PAYMENT	\$500.00	Attorney Docket No.	0140111

METHOD OF PAYMENT (check all that apply)

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FEE CALCULATION**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)	Multiple Dependent Claims	Fee (\$)	Fee Paid (\$)
- 20 or HP = 0	x	\$50.00	=	\$ 0.00	\$360.00	

HP = highest number of total claims paid for, if greater than 20

<u>Indep. Claims</u>	<u>Extra Claims</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>
- 3 or HP =	0	x \$200.00	= \$ 0.00

HP = highest number of independent claims paid for, if greater than 3

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41 (a)(1)(G) and 37 CFR 1.16(s).

<u>Total Sheets</u>	<u>Extra Sheets</u>	<u>Number of each additional 50 or fraction thereof</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>
- 100 =	0	/ 50 = 0 (round up to a whole number) x	\$250.00 =	\$ 0.00

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other: Filing a brief in support of an appeal\$500.00**SUBMITTED BY**

Signature		Registration No. (Attorney/Agent)	38135	Telephone	(949) 282-1000
Name (Print/Type)	Michael Farjami, Esq.	Date	3/29/06		

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **Alawani, et al.**

Art Unit: 2841

Serial No.: 10/623,243

Examiner: Levi, Dameon E.

Filed: July, 17, 2003

For: **Overmold MCM with Increased
Surface Mount Component Reliability**

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Honorable Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

This is an Appeal from the Examiner's Final Rejection of claims 1, 3-7, 9-16, and 18-20. The Final Rejection issued on November 1, 2005. The Notice of Appeal was filed in the U.S. Patent and Trademark Office on February 1, 2006.

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REAL PARTY IN INTEREST

The real party in interest is Skyworks Solutions, Inc.

RELATED APPEALS AND INTERFERENCES

There are no related Appeals or Interferences.

STATUS OF CLAIMS

Claims 1, 3-7, 9-16, and 18-20 are pending, and claims 2, 8, and 17 were canceled in previous amendments. Claims 1, 3-7, 9-16, and 18-20 have been finally rejected in a Final Rejection dated November 1, 2005. This Appeal is directed to the rejection of claims 1, 3-7, 9-16, and 18-20 which appear in the attached "Appendix of Claims on Appeal."

STATUS OF AMENDMENTS

No claim amendments have been entered after issuance of the Final Rejection of November 1, 2005.

SUMMARY OF CLAIMED SUBJECT MATTER**A. Claim 1**

Independent claim 1 defines an overmold module (e.g., structure 100 in Figure 1) including a surface mount component (e.g., surface mount component 102 in Figure 1) situated over a laminate circuit board (e.g., substrate 104 in Figure 1). *See, e.g.,* page 7, lines 19-20, page 8, lines 2-3 and Figure 1 of the present application. The surface mount component can be, for example, a passive component such as a resistor, a capacitor, an inductor, a diplexer, a diode, or a surface acoustic wave filter. *See, e.g.,* page 8, lines 12-14 of the present application. The surface mount component includes a first terminal (e.g., terminal 116 in Figure 1) and a second terminal (e.g., terminal 118 in Figure 1). *See, e.g.,* page 8, lines 10-11 and Figure 1 of the present application. The overmold module further includes a first pad (e.g., pad 106 in Figure 1) and a second pad (e.g., pad 108 in Figure 1) situated on the laminate circuit board, the first pad being connected to the first terminal (e.g., terminal 116 in Figure 1) and the second pad being connected to the second terminal (e.g., terminal 118 in Figure 1). *See, e.g.,* page 8, lines 2-3 and lines 10-11 and Figure 1 of the present application.

The overmold module (e.g., structure 100 in Figure 1) further includes a solder mask trench (e.g., solder mask trench 124 in Figure 1) situated underneath the surface mount component (e.g., surface mount component 102 in Figure 1), where the solder mask trench is situated over a top surface (e.g., top surface 110 in Figure 1) of the laminate circuit board (e.g., substrate 104 in Figure 1). *See, e.g.,* page 8, lines 21-22,

page 9, line 1. The solder mask (e.g., solder mask 112 in Figure 1) uniformly covers the top surface (e.g., top surface 110 in Figure 1) of the laminate circuit board (e.g., substrate 104 in Figure 1), however the solder mask does not cover the solder mask trench (e.g., solder mask trench 124 in Figure 1). *See*, e.g., page 8, lines 5-7, page 9, lines 1-2, and Figure 1 of the present application.

A bottom surface (e.g., bottom surface 126 in Figure 1) of the surface mount component (e.g., surface mount component 102 in Figure 1) and the top surface (e.g., top surface 110 in Figure 1) of the laminate circuit board form a moldable gap (e.g., moldable gap 125 in Figure 1). *See*, e.g., page 9, lines 5-7 and Figure 1 of the present application. The moldable gap includes the solder mask trench (e.g., solder mask trench 124 in Figure 1). *See*, e.g., page 9, lines 5-7 and Figure 1 of the present application. The solder mask trench (e.g., solder mask trench 324 in Figure 3) is filled with a molding compound (e.g., undermold 326 in Figure 3). *See*, e.g., page 11, lines 18-19 and Figure 3 of the present application.

Thus, the moldable gap (e.g., moldable gap 325 in Figure 3) and the solder mask trench (e.g., solder mask trench 324 in Figure 3) facilitate a flow of the molding compound (e.g., undermold 360 in Figure 3) underneath the surface mount component (e.g., surface mount component 302), which as disclosed in the present application, reduces the risk of forming voids in the moldable gap during the molding process. *See*, e.g., page 12, lines 2-4 and Figure 3 of the present application.

B. Claim 9

Independent claim 9 defines substantially the same subject matter as independent claim 1.

C. Claim 16

Independent claim 16 defines substantially the same subject matter as independent claim 1, with a difference being that claim 16 defines a multi-terminal surface mount device (as opposed to the two-terminal surface mount device defined by claim 1). Likewise, claim 16 defines multiple pads (as opposed to the two pads defined by claim 1) on the laminate circuit board, the pads being connected to the respective terminals of the surface mount device.

GROUND(S) OF REJECTION TO BE REVIEWED ON APPEAL

- A. Claims 1, 3-7, 9-16, and 18-20 under 35 USC §103(a) as being unpatentable over U.S. Patent No. 5,969,461 to Anderson et al. (hereinafter “Anderson”) in view of U.S. Patent No. 5,720,100 to Skipor et al. (hereinafter “Skipor”) and further in view of U.S. Patent No. 6,521,997 to Huang et al. (hereinafter “Huang”).

ARGUMENT**A. Rejection of claims 1, 3-7, 9-16, and 18-20 under 35 USC §103(a) as being unpatentable over Anderson in view of Skipor and further in view of Huang.**

Appellant respectfully submits that the present invention, as defined by independent claims 1, 9, and 16 is patentably distinguishable over Anderson, Skipor and Huang, either singly or in combination.

Anderson is directed to providing a package that encapsulates a “surface acoustic wave (SAW) device” such that the active area of the SAW device is isolated within a periphery of the device to prevent contamination. *See*, for example, Anderson, column 2, lines 12-13 and 23-24. Anderson specifically discloses the use of a dam that is “a photolithographically-defined standard solder mask material” which “prevents intrusion of foreign materials during overmolding and at any other time.” Anderson, column 3, lines 39-40 and lines 54-56 (emphasis added). Anderson, therefore, teaches away from forming a solder mask trench underneath a surface mount component (e.g., acoustic wave device 10 in Figure 1) to facilitate the flow of molding compound because the disclosure in Anderson prevents the flow of molding compound (underfill material 28) by using dam 26 (albeit that dam 26 is comprised of solder mask) to provide a sealed cavity 34 (i.e. a cavity void of molding compound). *See*, for example, Figure 2 of Anderson and column 5, lines 10-15.

The Examiner, on page 3 of the Office Action dated November 1, 2005, has acknowledged the deficiencies of Anderson by stating that Anderson “does not expressly

disclose wherein the solder mask trench is filled with the molding compound, or, wherein a solder mask uniformly covers said top surface of said laminate circuit board, and wherein said solder mask does not cover said solder mask trench,” as required by independent claims 1, 9, and 16 of the present invention.

The Examiner, however, has stated that Skipor “discloses an apparatus wherein the solder mask trench is filled with molding compound.” Office Action of November 1, 2005, page 3. The structures disclosed in Skipor (e.g., Figure 1 and Figure 2 of Skipor), however, include an “assembly in which an integrated circuit die is spaced apart from a printed circuit board by a gap [e.g., gap 30 in Figures 1 and 2 of Skipor] and is attached by solder bump interconnections that extend across the gap and connect bond pads on the die to bond pads on the board.” Skipor, column 1, lines 59-63 (emphasis added). More importantly, as shown in Figure 2 of Skipor, gap 30 is defined by die bond pads 28, solder bump interconnections 32, and board bond pads 22. Skipor does not make any reference to, and does not even mention, the words “solder mask” anywhere in its disclosure. Skipor merely discloses a structure spaced apart by a gap that occurs as a result of the particular assembly involved and not by modifying the solder mask as required by the present invention.

The Examiner has stated that Huang discloses: “an apparatus wherein a solder mask uniformly covers said top surface of said laminate circuit board and wherein said solder mask does not cover said solder mask trench.” Office Action of November 1, 2005, page 3. Huang, however, does not teach, disclose, or suggest the use of a laminate circuit

board as disclosed and claimed by the present invention. Huang actually teaches away from the use of a laminate circuit board by disclosing that: “chip carrier 1’ [sic] of the second embodiment [shown in Figure 4 of Huang] is structurally identical to that of the first embodiment [shown in Figures 1 and 2 of Huang], as both are a substrate for use in a BGA (ball grid array) semiconductor package.” Huang, column 4, lines 5-8.

Thus, Huang is directed to a discrete chip packaging technology and not to a laminate printed circuit board as disclosed and claimed by the present invention. The ball grid array package disclosed by Huang is not analogous to a laminate printed circuit board. A ball grid array package is utilized prior to integrating various packages (such as a BGA package) and/or various surface mount components and devices on a laminate printed circuit board. In other words, Huang’s ball grid array semiconductor package is indented to be mounted onto and supported by a laminate printed circuit board, such as that disclosed and claimed by the present invention. Thus, Huang is directed to a discrete semiconductor packaging technology, while the present invention is directed to a laminate printed circuit board technology, the latter being suitable for hosting a discrete semiconductor package, such as Huang’s semiconductor package. Huang, therefore, is directed to a different technology (i.e., to BGA semiconductor packaging) than the present invention. As such, Huang does not teach, disclose, or suggest a solder mask trench that “is situated over a top surface of said laminate circuit board,” as recited by independent claims 1, 9, and 16 of the present invention.

Huang also fails to teach, disclose, or suggest a solder mask that “uniformly covers said top surface of said laminate circuit board,” as recited by independent claims 1, 9, and 16 of the present invention. As shown in Figure 1 of Huang, the solder mask layer does not uniformly cover the top surface of chip carrier 1 because only the “trace forming area 101 is applied with a solder mask layer 11 for covering the conductive traces on the trace forming area 101.” Huang, column 3, lines 12-15. As such, Huang clearly discloses that solder mask layer 11 covers only a portion of the top surface of chip carrier 1. Moreover, since Figures 1 through 4 of Huang only show a portion of the solder mask layer, Huang fails to teach, disclose, or suggest a solder mask that uniformly covers the entire core layer.

In further contrast to the present invention, Huang also does not teach, disclose, or suggest a solder mask trench situated over a top surface of a laminate circuit board, as required by the present invention. Huang merely discloses that: “a recessed portion 13 is formed at the solder mask layer 11 between the pair of solder pads 12.” Huang, column 3, lines 20-22 (emphasis added). Referring to the elliptical “recess” shown in Figure 1, this recess in Huang does not suggest the use of a solder mask trench as required by the present invention.

Thus, Huang does not teach, disclose, or suggest a solder mask trench that is situated over a top surface of a laminate circuit board, “wherein a solder mask uniformly covers said top surface of said laminate circuit board, and wherein said solder mask does not cover said solder mask trench,” as defined by independent claims 1, 9, and 16 of the

present invention. Furthermore, since Huang is directed to a different technology than the present invention, no motivation or suggestion to combine Huang with Anderson and Skipor can be found in any of the mentioned disclosures. Thus, the present invention cannot be achieved by combining Huang with the disclosures in Anderson and Skipor.

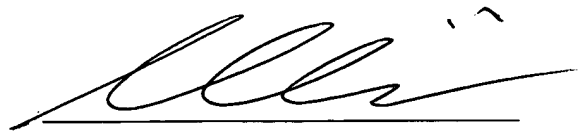
CONCLUSION

For all the foregoing reasons, Appellant respectfully submits that independent claims 1, 9, and 16 are patentably distinguishable over Anderson, Skipor, and Huang, either singly or in combination. Therefore, dependent claims 3-7, 10-15, and 18-20 are also patentably distinguishable over Anderson, Skipor, and Huang for reasons similar to those discussed above, and further for the additional limitations contained in each dependent claim. Thus, an early allowance of claims 1, 3-7, 9-16, and 18-20 pending in the present application is respectfully requested.

This Appeal Brief is submitted herewith with an Appendix of the appealed claims and the requisite fee for filing the Appeal Brief.

Respectfully Submitted,
FARJAMI & FARJAMI LLP

Date: 3/29/06



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Date of Deposit: 3/29/06

Christina Carter
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Christina Carter 3/29/06
Signature Date

APPENDIX OF CLAIMS ON APPEAL

Claim 1: An overmolded module comprising:

a surface mount component situated over a laminate circuit board, said surface mount component comprising a first terminal and a second terminal;

a first and a second pad situated on said laminate circuit board, said first pad being connected to said first terminal and said second pad being connected to said second terminal;

a solder mask trench situated underneath said surface mount component, wherein said solder mask trench is situated over a top surface of said laminate circuit board, wherein a solder mask uniformly covers said top surface of said laminate circuit board, and wherein said solder mask does not cover said solder mask trench;

wherein a bottom surface of said surface mount component and said top surface of said laminate circuit board form a moldable gap, said moldable gap including said solder mask trench, wherein said moldable gap and said solder mask trench facilitate a flow of a molding compound underneath said surface mount component, and wherein said solder mask trench is filled with said molding compound.

Claim 3: The overmolded module of claim 1 wherein said moldable gap is filled with said molding compound.

Claim 4: The overmolded module of claim 1 further comprising an overmold, said overmold being situated over said surface mount component.

Claim 5: The overmolded module of claim 1 wherein said surface mount component is selected from the group consisting of a resistor, a capacitor, an inductor, a diplexer, a diode, and a SAW filter.

Claim 6: The overmolded module of claim 3 wherein said moldable gap has a height of between approximately 45.0 micrometers and 65.0 micrometers.

Claim 7: The overmolded module of claim 1 wherein said overmolded module is an MCM.

Claim 9: An overmolded module comprising:

- a surface mount component situated over a laminate circuit board, said surface mount component comprising a first terminal and a second terminal;
- a first and a second pad situated on said laminate circuit board, said first pad being connected to said first terminal and said second pad being connected to said second terminal;
- a moldable gap situated underneath said surface mount component, said moldable gap comprising a solder mask trench, wherein said solder mask trench is situated over a

top surface of said laminate circuit board, wherein a solder mask uniformly covers said top surface of said laminate circuit board, and wherein said solder mask does not cover said solder mask trench, and wherein said moldable gap and said solder mask trench facilitate a flow of a molding compound underneath said surface mount component, and wherein said solder mask trench is filled with said molding compound.

Claim 10: The overmolded module of claim 9 wherein said moldable gap is filled with said molding compound.

Claim 11: The overmolded module of claim 9 further comprising an overmold, said overmold being situated over said surface mount component.

Claim 12: The overmolded module of claim 11 wherein said overmold comprises said molding compound.

Claim 13: The overmolded module of claim 9 wherein said moldable gap has a height of between approximately 45.0 micrometers and 65.0 micrometers.

Claim 14: The overmolded module of claim 9 wherein said surface mount component is selected from the group consisting of a resistor, a capacitor, an inductor, a diplexer, a diode, and a SAW filter.

Claim 15: The overmolded module of claim 9 wherein said overmolded module is an MCM.

Claim 16: An overmolded module comprising:

a surface mount device situated over a laminate circuit board, said surface mount device comprising a plurality of terminals;

a plurality of pads situated on said laminate circuit board, each of said plurality of pads being connected to a respective one of said plurality of terminals;

a solder mask trench situated underneath said surface mount device, wherein said solder mask trench is situated over a top surface of said laminate circuit board, wherein a solder mask uniformly covers said top surface of said laminate circuit board, and wherein said solder mask does not cover said solder mask trench, and wherein said solder mask trench facilitates a flow of a molding compound underneath said surface mount component, and wherein said solder mask trench is filled with said molding compound.

Claim 18: The overmolded module of claim 16 wherein said surface mount device is a leadless surface mount device.

Claim 19: The overmolded module of claim 16 wherein said surface mount device comprises at least one component, said at least one component being selected from the group consisting of an active component and a passive component.

Claim 20: The overmolded module of claim 16 wherein said overmolded module is an MCM.

EVIDENCE APPENDIX

(NONE)

RELATED PROCEEDINGS APPENDIX

(NONE)